REMARKS

Claims 1-18 are pending and rejected in this application. Claim 1 is amended; and claim 2 is cancelled hereby.

Responsive to the rejection of claims 1-18 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,703,593 (Sopory), Applicant has amended claim 1 and respectfully traverses the rejection of claims 11-14, and submits that claims 1-18 are now in condition for allowance.

Sopory discloses a low and high voltage electrical heating device (Fig. 6) including a co-axial heater cable 100. Positive temperature coefficient layers act as an extended resistor circuit in parallel with the two electrodes. Cable 100 can easily be cut to length to suit the application. Central electrode 102 can be a unitary wire or preferably a sixteen AWG nickel-copper stranded buss wire, although any gauge is possible, which is surrounded by a first layer 104 of semi-conductive positive temperature coefficient (PTC) material. This is surrounded by a second layer 106 of high-temperature polymer, preferably PTC or negative temperature coefficient (NTC) material. Or even a zero temperature coefficient (ZTC) material. Second layer 106 is surrounded by second electrode 108, which is preferably 16 AWG equivalent nickel-copper braid. This entire assembly is surrounded by a fluoropolymer or any other appropriate outer insulation 110 (column 6, line 52 through column 7, line 18).

Deo et al. discloses a composition heating element for rapid heating (Figs. 1-8A) including a self-regulating, resistive heating element 10. Element 10 has a desired predetermined temperature profile and is composed of at least two separate heating element materials. A first heating element material forms an inner or core layer 12 of heating element 10. A second heating element material forms an outer layer 14 of heating element 10. Core layer 12 has a resistivity

value which ranges from a first value to a second substantially higher value over a given temperature range. Inner core layer 12 is formed using an electrically conductive material such as nickel. Heating element 10 has a predetermined heating profile by which heating element 10 undergoes a rapid increase in temperature from an ambient room temperature. The assembly is effectively composed of an element whose overall resistance corresponds to that of a pair of resistors connected in parallel (column 3, line 63 through column 4, line 45).

In contrast claim 1, as amended, recites in part:

> an average power limiting device electrically connecting said first conductor and said second conductor at said second end, said first conductor being directly electrically connected to said second conductor at said first end.

(Emphasis added). Applicant submits such an invention is neither taught, disclosed nor suggested by Sopory, Deo et al. or any of the other cited references, alone or in combination and includes distinct advantages thereover.

Sopory discloses a low and high voltage electrical heating device including two electrical conductors separated by and connected to a conductive material that conducts electrical power between the two electrodes over the length of the electrodes. Deo et al. discloses a composition heating element for rapid heating, including a first heating element material forming an inner core and a second heating element material forming an outer layer. In contrast Applicant's invention includes two conductors that are connected at one end and having an average power limiting device connected to another end. There is no electrical conduction between the conductors over the length of the heating cable and they are only electrically connected at a end that is cut to length. The resistivity of the conductors determine a potential heat production of the cable. It is the average power limiting device that provides a predetermined power density so that the cable itself does not overheat and that the desired amount of heat is delivered to the environment

surrounding the heating cable. Sopory includes two conductors with a conductive layer between the conductors over the length of the cable. The cable of Sopory can be cut-to-length and the heat density of Sopory does not alter since the heat density is determined by the conductive layer between the electrodes and not the length of the cable. In contrast, Applicant's cable when cut and directly electrically connected at the cut end will alter the power density of the cable, since the resistance will be reduced in an amount proportional to the length of cable removed. The direct connection of the first conductor and the second conductor at the cut end would thereby increase the power density if it were not for the average power limiting device, since power density is related to the square of the current, which would be increased by the reduced length. Therefore, Sopory, Deo et al. and any of the other cited references, alone or in combination, fail to disclose, teach or suggest an average power limiting device that electrically connects a first conductor and a second conductor at a second end, the first conductor being directly electrically connected to the second conductor at a first end, as recited in claim 1.

An advantage of Applicant's invention is that the heating cable is inexpensively produced. Another advantage is that there is no need to have conductive layers between conductors in the heating cable. Yet another advantage is that the cut end of the heating cable is electrically connected, thereby not requiring any special steps of keeping conductors separated from each other. For the foregoing reasons, Applicant submits that claim 1, and claims 3-10 depending therefrom, are now in condition for allowance, which is hereby respectfully requsted.

In further contrast, claim 11 recites in part:

> a center conductor having a conductivity characteristic;
> an insulating layer substantially surrounding said center conductor;
> a resistive conductor layer substantially surrounding said insulating layer,

(Emphasis added). Applicant submits that such an invention is neither taught, disclosed nor suggested by Sopory, Deo et al. or any of the other cited references, alone or in combination and includes distinct advantages thereover.

Sopory discloses a low and high voltage electrical heating device including a coaxial heater cable. A positive temperature coefficient layer acts as an extended resistor circuit in parallel with the two electrodes. Deo et al. discloses a composition heating element for rapid heating including a heating element having an inner core and a second heating element material forming an outer layer of a heating element. If Sopory included an insulating layer substantially surrounding the inner conductor, it would fail to function because it would no longer have a distributed heating element by way of the conductive layer between the electrical elements. This would cause Sopory to fail to function for its intended purpose. Further, if the two electrodes were connected, as in Applicant's invention, this would defeat the intended purpose of Sopory by causing a short circuit leading to a catastrophic failure of the cable of Sopory. Deo et al. teaches two resistive elements in parallel and not an insulating layer between. Therefore, Sopory, Deo et al. and any of the other cited references, alone or in combination, fail to disclose, teach or suggest a center conductor having a conductivity characteristic, an insulating layer substantially surrounding the center conductor and a resistive conductor layer substantially surrounding the insulating layer, as recited in claim 11.

An advantage of Applicant's invention is that the heating cable is inexpensively produced. Another advantage is that there is no need to have conductive layers between conductors in the heating cable. Yet another advantage is that the cut end of the heating cable can be directly electrically connected, thereby not requiring any special steps of keeping conductors separated

from each other. For the foregoing reasons, Applicant submits that claim 11, and claims 12 & 13 depending therefrom, are now in condition for allowance, which is hereby respectfully requested.

In still further contrast claim 14, recites in part:

> selecting a predetermined heat density for said at least one heating cable;
>
> determining a resistance value of at least one said heating cable; and
>
> delivering electrical current to said heating cable dependent on said resistant value and said predetermined heat density.

(Emphasis added). Applicant submits such an invention is neither taught, disclosed nor suggested by Sopory, Deo et al. or any of the other cited references, alone or in combination and includes distinct advantages thereover.

Sopory discloses a low and high voltage electrical heating device including a coaxial heater cable. A positive temperature coefficient layer acts as an extended resistor circuit in parallel with the two electrodes. Deo et al. discloses a composition heating element for rapid heating including a heating element having an inner core and a second heating element material forming an outer layer of a heating element. Neither of the cited prior art references teach the steps of selecting a predetermined heat density for the application of the heating cable and then delivering electrical current to the heating cable dependent upon the resistance value of the cable and the predetermined heat density of the cable. Resistance value of the cable will be altered depending upon the length of the cable when it is cut and terminated on one end. The energy to the cable is controlled by a determination of the resistance value and the predetermined heat density desired to be output from the heating cable. Electrical current is then delivered dependent upon the selected heat density and the resistance value of the cable, thereby allowing a cable to be of various resistance values. The various resistance values of a heating cable results when the overall length of the cable is altered, thereby reducing the resistance value, which would have an

additional result of increasing the current flow therethrough except that the method of Applicant's invention is utilized to alter the amount of electrical current being delivered to the heating cable. Therefore, Sopory, Deo et al. and any of the other cited references, alone or in combination, fail to disclose, teach or suggest the steps of selecting a predetermined heat density for a heating cable, determining a resistance value of the heating cable and delivering electrical current to the heating cable dependent on the resistance value and the predetermined heat density, as recited in claim 14.

An advantage of Applicant's invention is that the heating cable can be cut and terminated to any length. Another advantage of Applicants invention is that a variation in the resistance value of a produced heating cable is taken into consideration in the determining step and the electrical current supplied to the cable is dependent upon the determined resistance value and the desired heat density to be dissipated by the cable. For the foregoing reasons, Applicant submits that claim 14, and claims 15-18 depending therefrom, are in condition for allowance, which is hereby respectfully requested.

For the foregoing reasons, Applicant submits that no combination of the cited references teaches, discloses or suggests the subject matter of the amended claims. The pending claims are therefore in condition for allowance, and Applicant respectfully requests withdrawal of all rejections and allowance of the claims.

In the event Applicant has overlooked the need for an extension of time, an additional extension of time, payment of fee, or additional payment of fee, Applicant hereby conditionally petitions therefor and authorizes that any charges be made to Deposit Account No. 20-0095, TAYLOR & AUST, P.C.

Should any question concerning any of the foregoing arise, the Examiner is invited to telephone the undersigned at (260) 897-3400.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: MS Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on: January 20, 2005.

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